

## **Abstract**

In this vehicle, the diamagnetic fields principles are applied to obtain a hovering and propulsion effect which makes low cost, friction free and zero pollutant emissions transport media. This is done using a special combination of electromagnetic generators and the natural diamagnetic susceptibility present in all elements. The physical effect of this phenomenon is an air gap between the surface and the vehicle. The height of levitation has a direct relationship with the material used as floor surface; since all materials have different diamagnetic susceptibility factors. Also, the power on the diamagnetic field generator is a key for the levitation and propulsion effect. All these factors make this prototype vehicle an easy maneuverable one, since there are almost no inertial forces present in the system.

## **Introduction:**

A diamagnetic force can be used to produce vehicular motion, instead of direct mechanical, hydraulic, or pneumatic force. Diamagnetic forces are formed, for example; by the induction of current through a coil or solenoid, or are already present in a permanent magnet. The application used is the diamagnetism, which is not a very common electromagnetic principle. It is well known that when a piece of iron is in presence of an electromagnetic field, an attraction effect will occur between them, this is due to the natural atomic orientation or polarization of the iron atoms. This phenomenon is better known as Ferromagnetism.

Diamagnetism can be understood as the opposite case of ferromagnetism; hence having an element that is in presence of an electromagnetic field, the atoms will repel or move away from the electromagnetic field source. Now, applying this concept to a vehicular system, a reliable levitation transport media results. Using a cost efficient diamagnetic element as "running" surface and specially designed electromagnetic generators a vehicle can levitate from the ground and move with almost no friction. The whole concept is to have a special composite surface to run the vehicle instead of regular asphalt roads. This transport media runs on electricity, which could be obtained from the sun, solar cells and high efficiency batteries. The experimental top speed of the system is 560km/hr or 348mi/hr; these results were obtained from previous experiments done with similar electromagnetic transport devices, such as Germany's Maglev Transrapid train. The vehicle's safe running speed is 144km/hr or 90 mph. The system maintenance is non-complex due to the simplicity and small quantity of parts. The height of levitation for this scale prototype is 11cm and the max load supported is 1.5 times the vehicles weight, it uses 15amps AC and 120V. There is no need of lubricants or oil in the system, since there are no rolling parts or internal combustion engine.

## **Pollution**

As my invention runs on electrical energy, there is no air pollution along the way. The diamagnetic vehicle has contact free support, guidance, braking and propulsion system, thereby eliminating the sound of wheels and engine noise. Since the only sound is caused

by the displacement of air, it is extremely quiet compared with other modes of transportation.

## Diamagnetism

A diamagnetic substance is one whose atoms have no permanent magnetic dipole moment. When an external magnetic field is applied to a diamagnetic substance such as bismuth or silver, a weak magnetic dipole moment is induced in the direction opposite the applied field (Lenz's Law). The effect of diamagnetism is present in all matter but is weak compared to paramagnetism or ferromagnetism ( $\chi < 10^{-5}$ ) and would be masked by a permanent dipole moment. For a qualitative classical understanding consider 2 electrons in the same orbit but in opposite direction. The magnetic moments of the two electrons are equal and opposite so they cancel. When an external magnetic field is applied, the electrons experience an additional force  $qv \times B$  which increases the orbital speed of the electron whose magnetic moment is antiparallel to the field decrease. The speed of the electron with parallel moment, the magnetic moments, no longer cancel and the substance acquires a net dipole moment that opposes the applied field.

## Problem:

*To create a cost-efficient, zero pollutant, easy maintenance transport media*

## Problem specifications:

In order to obtain the desired hovering effect, aluminum was used as running surface, since its diamagnetic characteristics are good from a cost-efficiency basis. Three diamagnetic generators were used as propulsion engines in the vehicle. These generators have directional controls for speed and direction. The levitation height and speed is controlled with frequency and power regulator. The system stability is obtained by either using equal magnitude or parallel electromagnetic generators or by applying a rotational force to the system, so that the centrifugal forces in the device balance all forces present in the vehicle. Energy is stored with height efficiency gel batteries. The power is obtained through regular AC outputs or photovoltaic cells. The brake system works with the inversion of the direction of the diamagnetic generators. The vehicle chassis is made of Al-Cu alloy. In order to obtain test values for speed velocity, acceleration and forces present in the vehicle, **Working Model 2D** computer program were used. Using this program a kinetic analysis was done on the vehicle taking into consideration critical design factors such as: kinetic and static friction, air resistance, electrostatic charge, weight, shape, material and center of gravity.

## Background:

For many years we have had transportation vehicles which are less efficient in relation with the energy it uses. The majority of the energy is lost between friction and heat. These machines only use from 15%-30% of consumed energy. Another problem related to the current transportation media suffer is their unavailability to operate on all kinds of surface or environment. For each surface, utility or environment a different type of design is needed.